MDEQ Response to EPA Request

Regarding: Area 1 FS for Kalamazoo Superfund Site dated October 30, 2012, prepared by ARCADIS on behalf of Georgia-Pacific

USEPA Request

First in terms of comments.

1. A concise comment describing the need to include lipid based concentrations for fish and how that shows a decrease in decay rate. (This could be two comments) [Request 1 and 2]
2. A discussion of the problem with the SWAC calculations and a proposed alternative approach(es) [Request 3]
3. Given the SWAC and lipid discrepancies as noted above we should have the PRPs add sediment remedies for River sections 2, 3 and 4 (since the other areas have lower SWACs and we believe this is where the majority of the mass also exists) including removal to RALs of 2, 5 and 10. (We would need volumes and costs for each along with the decay curves.) If you believe that 2, 5 and 10 provide the same answer it may be more appropriate to reduce the number of RALs. [Request 4]

For further internal discussion.
A. Given the slower decay curves produced by John K. I would like to see where the various sediment remedies proposed by GP fall along the time curve and how they impact fish tissue concentration over time. (This issue speaks to the time interval used in RAO 1). I want to make sure the 10 year time frame is appropriate. [Request 5]

Request 1: Comment regarding need to include lipids in tissue and trend analysis

MDEQ (Kern) evaluations indicate that the trends based on wet-weight PCBs overstate the rate of decline in carp and smallmouth bass tissue samples. Lipid content was found to explain a significant portion of the PCB decline. Therefore, much of the apparent decay of PCBs in tissue is explained by temporal variation in lipid content (see Figure 4 for carp, below). Extrapolation of wet weight PCB decay trends requires the assumption that lipid content trends will continue to decline through time as well. However, it is not possible for lipids to decline below species specific minimums and therefore PCB trend calculations need to consider and compensate for lipid trends. MDEQ has provided a draft report using a defensible approach to calculate PCB trends while accounting for changes in tissue lipid content.

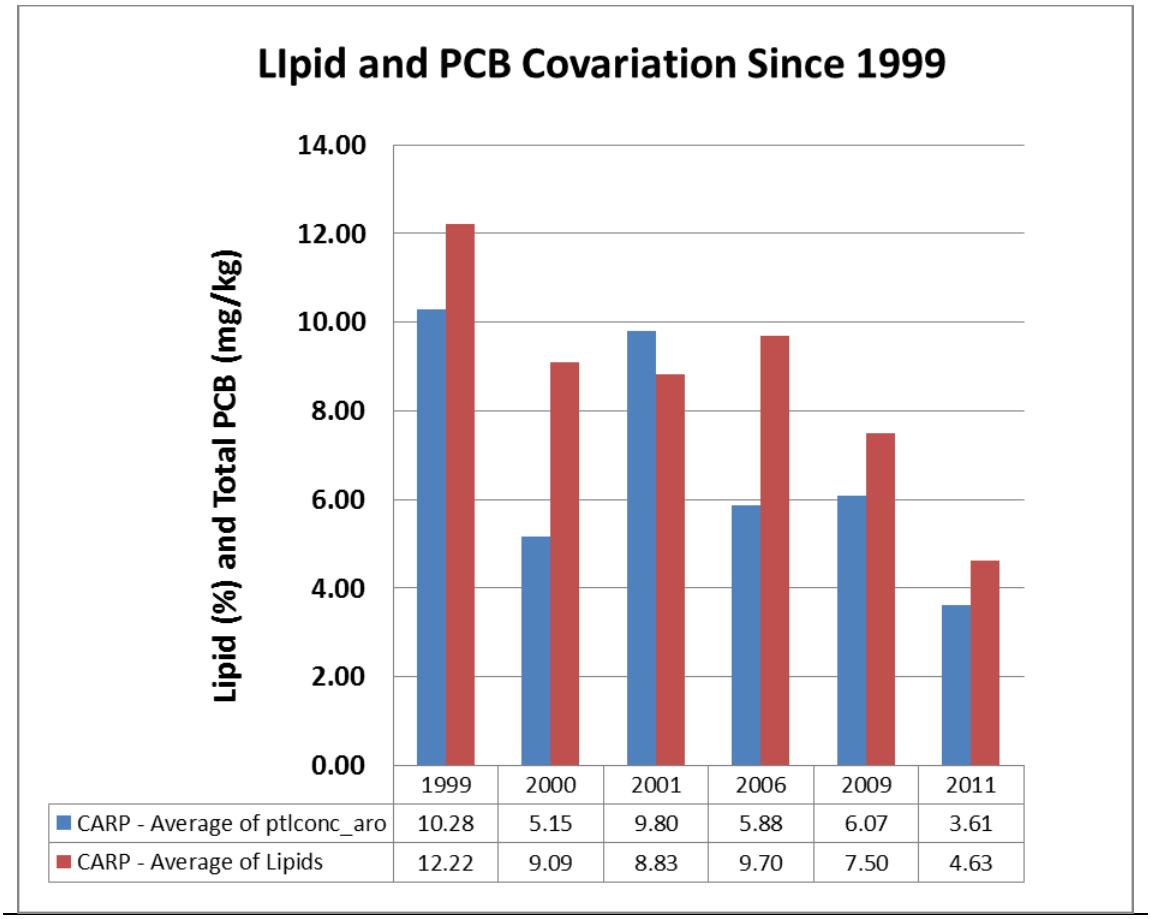


Figure 4 - Temporal decline in wet-weight PCB and lipid content in Carp fillets from Kalamazoo, Mosel and D-Avenue sampling stations.

Request 2: Comment on estimated PCB decay rates in fish tissue considering lipid trends

After adjusting for co-variation with lipid, temporal trends in tissue PCB concentrations were on the order of 3% per year (Table 3, below) as compared to 6% reported in the FS. Assuming these decay rates would continue indefinitely into the future, time horizons to even minimally protective fish tissue concentrations (e.g. Central Tendency Sport Angler, 100% smallmouth bass diet, tissue level of 0.2mg/kg) are on the order of 30 or more years as opposed to the much shorter time horizons reported in the FS. Further, fitting a mixed order model to fish tissue data indicated that decay rates are slowing with time, indicating that the assumption of indefinite first order decay rates represents optimistic forecasts.

Table 3 - Regression function parameter estimates for temporal models.

	Variable	Parameter Estimate	Standard Error	t Value	Pr > |t|	Squared Semi-partial Correlation
Carp Fillets	**Intercept**	47.00	18.67	2.52	0.01	.
	year	**-0.02**	0.01	-2.53	0.01	0.03
	logLipids	0.92	0.07	12.72	<.0001	0.64
						Adjusted R^2=0.70
Smallmouth Bass Fillets	**Intercept**	42.00	20.11	2.09	0.04	.
	year	**-0.02**	0.01	-2.12	0.04	0.02
	logLipids	0.79	0.08	9.34	<.0001	0.39
						Adjusted R^2=0.61
Whole-body YOY Smallmouth Bass	**Intercept**	74.87	22.22	3.37	0.00	.
	year	**-0.04**	0.01	-3.45	0.00	0.10
	logLipids	1.11	0.13	8.64	<.0001	0.60
						Adjusted R^2=0.80

Request 3: Discussion of SWAC issues and recommended approach

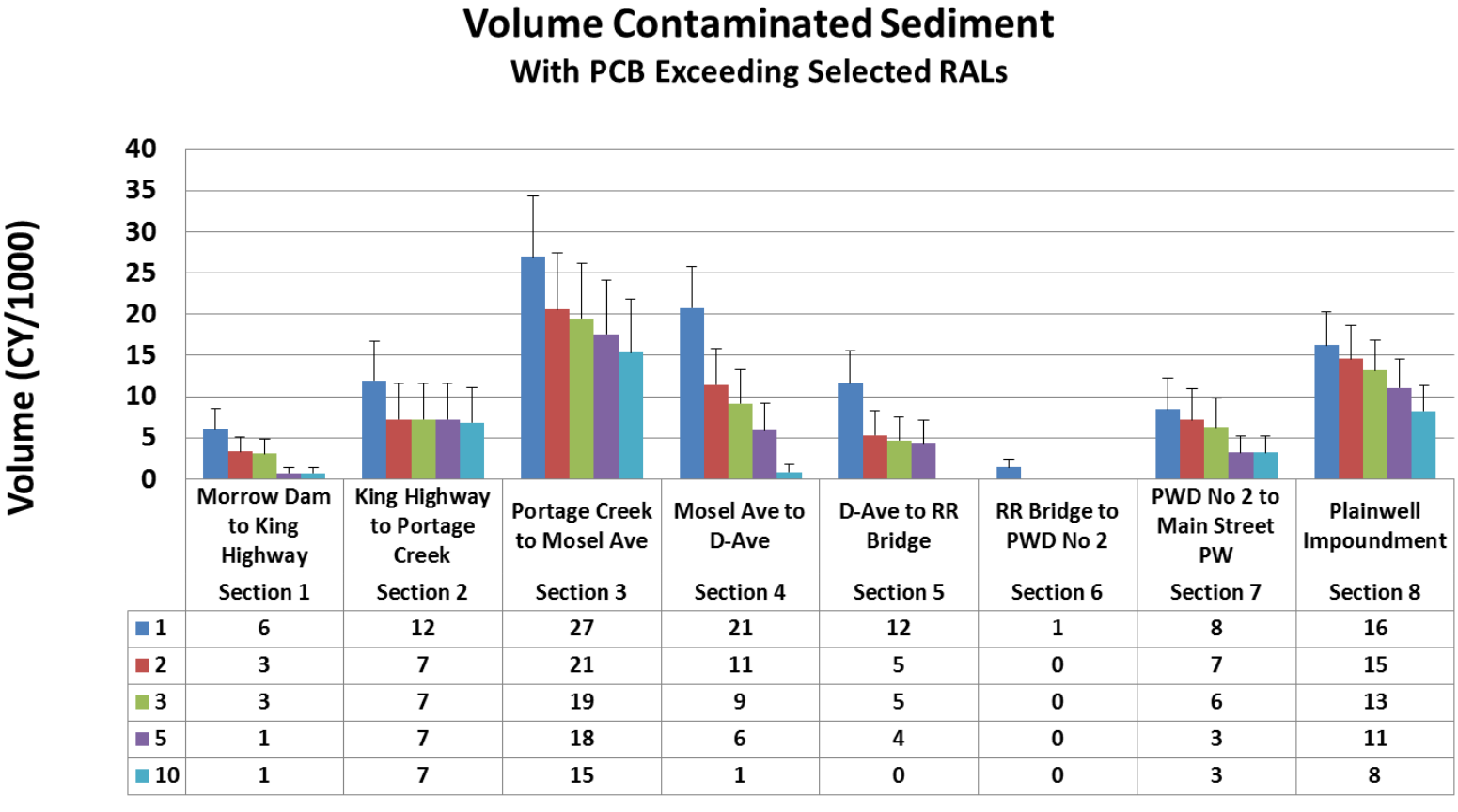
Methods used to estimate SWAC in Area 1 incorrectly combined "judgmentally-located " (i.e. biased) samples with unbiased samples, understating the average PCB concentration in surface sediments by up to a factor of 9. This estimation bias is caused by 1) incorrect handling of data generated through post-hoc identification of hot-spot investigation areas; and 2) improperly combining biased and unbiased data within stream tubes in "non-hot-spot" areas. To avoid this problem of combining biased and unbiased data for wide ranging terrestrial species, it was agreed in the EPC work group meetings that only unbiased data would be used to estimate SWACs. The same rationale suggests that unbiased sample data should also be used for estimation of PCB exposure (i.e. SWAC) for wide ranging aquatic species including smallmouth bass and common carp.

Table 4 highlights the differences in SWAC values based on streamtubes, unbiased 93/94 data, and all unbiased data. Taken together it is recommended that the SWAC estimates reported in the Area 1 FS be replaced with estimates based on the arithmetic average of unbiased samples collected in 1993/94. Transect based, apparently unbiased, sampling programs were also conducted in 2000 and 2007, although it is unclear whether the spatial extent and balance is similar to that obtained in 1993/94, so uncritical use of these samples may also cause unintended biases. If the RPs desire to combine samples collected in 2000 and 2007 with those from the 1993/94 survey, they should be carefully evaluated in consultation with USEPA and the MDEQ prior to incorporation into SWAC estimates. Detailed findings supporting this comment can be found in the accompanying memorandum.

Table 4 - Total PCB Concentration in surficial sediments.														
		Supplemental FS Stream Tube		MDEQ Analysis										
				Unbiased Samples (1993-1994)						All Unbiased Samples (1993-2007)				
SRI Reach		N	SWAC (mg/kg)	Sample Count	SWAC (mg/kg)	LCL 95	UCL 95	Thiessen Poly SWAC (mg/kg)		N	SWAC (mg/kg)	LCL 95	UCL 95	
Morrow Dam to King Highway	1	85	0.072	80	0.19	0.10	0.41	0.12		97	0.17	0.09	0.30	
King Hwy to Portage Creek	2	29	0.26	41	2.41	0.18	10.63	4.42		66	4.30	0.50	9.38	
Portage Creek to Mosel Ave	3	30	0.35	17	2.91	0.30	13.18	4.95		50	1.30	0.36	3.87	
Mosel Ave to D-Ave	4	130	0.43	81	1.24	0.34	4.64	4.66		139	0.94	0.36	2.38	
D-Ave to RR Bridge	5	110	0.31	65	0.42	0.25	0.77	0.67		89	0.51	0.30	0.82	
RR Bridge to Plainwell No 2.	6	24	1.1	9	0.24	0.09	0.47	0.45		18	0.30	0.15	0.50	
Plainwell No2. to Main Street Plainwell	7	39	0.96	8	0.78	0.18	2.46	1.39		52	1.72	0.46	4.39	

Request 4: Add remedies for Area 1 Sections 2, 3, and 4 with additional RALs

Given the issues identified above, MDEQ supports EPA in requesting the RPs to add additional sediment remedies to reflect additional options that decision makers may wish to consider in making risk-based remedy decisions. Using the instream RALs of 1, 2, 3, 5, and 10 mg/kg the following figure was prepared to illustrate unbiased estimates of volumes by Area 1 river reach. Note that Section 8 represents pre-TCRA conditions and is presented for reference only.



	Morrow Dam to King Highway Section 1	King Highway to Portage Creek Section 2	Portage Creek to Mosel Ave Section 3	Mosel Ave to D-Ave Section 4	D-Ave to RR Bridge Section 5	RR Bridge to PWD No 2 Section 6	PWD No 2 to Main Street PW Section 7	Plainwell Impoundment Section 8
1	6	12	27	21	12	1	8	16
2	3	7	21	11	5	0	7	15
3	3	7	19	9	5	0	6	13
5	1	7	18	6	4	0	3	11
10	1	7	15	1	0	0	3	8

Figure 12 - Volume of PCB containing sediments associated with remedial action limits of 1, 2, 3, 5 and 10 mg/kg.

Request 5: Given the MDEQ trend estimates, how do GP remedies impact the fish tissue concentration vs. time curves

Based on the issues related to SWAC and decreased time trend estimates, the first order monitored natural recovery line, represents our best estimate of the fish tissue response to the GP proposed alternatives SED 1 through 5. SED 6 would be expected to fall on the 1 ppm RAL line as shown in the following figure for the Portage Creek to Mosel Avenue reach (Section 3). This will be refined based on discussions with EPA and RPs once the requirements of the additional alternatives have been defined.